Psychology 351 - Psychology of Perception
Pomerantz, Rice University, Week 3

Measurement in Perception: Psychophysics and Signal Detection Theory

Detection: Is there any stimulus out there?
Discrimination: Are the stimuli out there different?
Recognition: Does this stimulus belong to a known category (e.g. dog)?
Identification: Is this a specific stimulus (e.g., my dog Spot)?
Scaling
Absolute threshold
    Graphical representation
    Methods: limits, constant stimuli, staircase
Human threshold data
    Logarithmic scales
Problem of catch trials
Signal Detection Theory
Hits, misses, false alarms, correct rejections

		Stimulus Presented? Yes	No
Response	"Yes"	Hit	False Alarm
Given	"No"	Miss	Correct Rej.

		Stimulus Presented? Yes	No	SDT stats
Response	"Yes"	0.65	0.35	d' = .78
Given	"No"	0.35	0.65	ß = 1.0

		Stimulus Presented? Yes	No	
Response	"Yes"	0.16	0.04	d' = .76
Given	"No"	84	0.96	ß = 2.83

		Stimulus Presented? Yes	No	
Response	"Yes"	0.66	0.92	d' = -1.0
Given	"No"	0.34	0.08	ß = 2.49

Scaling: How does our perception change as a stimulus is changed in intensity?

E.g., does making a light twice as intense make it look twice as bright?

Answer = no. Our sensory systems are non-linear.

Weber's Law: $\Delta I / I = k$ (I = intensity of stimulus measured physically)

Jnd's

Light intensity: 1/60; lifted weights: 1/50; table salt: 1/3

Fechner's Law: $S = k \log I$ (Sensation is a log function physical intensity)

Steven's Law: $S = kI^b$ (Sensation is a power function of physical intensity)

Linear function: $y=mx+b$

increasing stimulus by one amount changes perception by another amount; results in a straight line on normal graph paper

Log function: $y = m \ln (x) + b$

Exponential function: $y = me^{bx}$

Power function: $y=mx^b$

increasing stimulus by one proportion changes perception by another proportion results ina straight line on log-log graph paper; slope indicates exponent

Judgments of numerosity

Images

Images

Rod Cone Thresholds

Rod Cone Sensitivity

Purkinje Shift

Sensitivity Vs. Rod Density

Modulation Transfer Function

Equiloudness Contours

Dot Numerosity Scaling